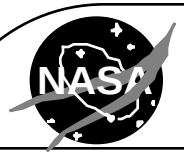

The GLOBE Program
and
Software Based Telemetry Processing

Steve Duran
Code 514.2
Data Capture Systems Section
Goddard Space Flight Center
NASA, USA
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AGENDA

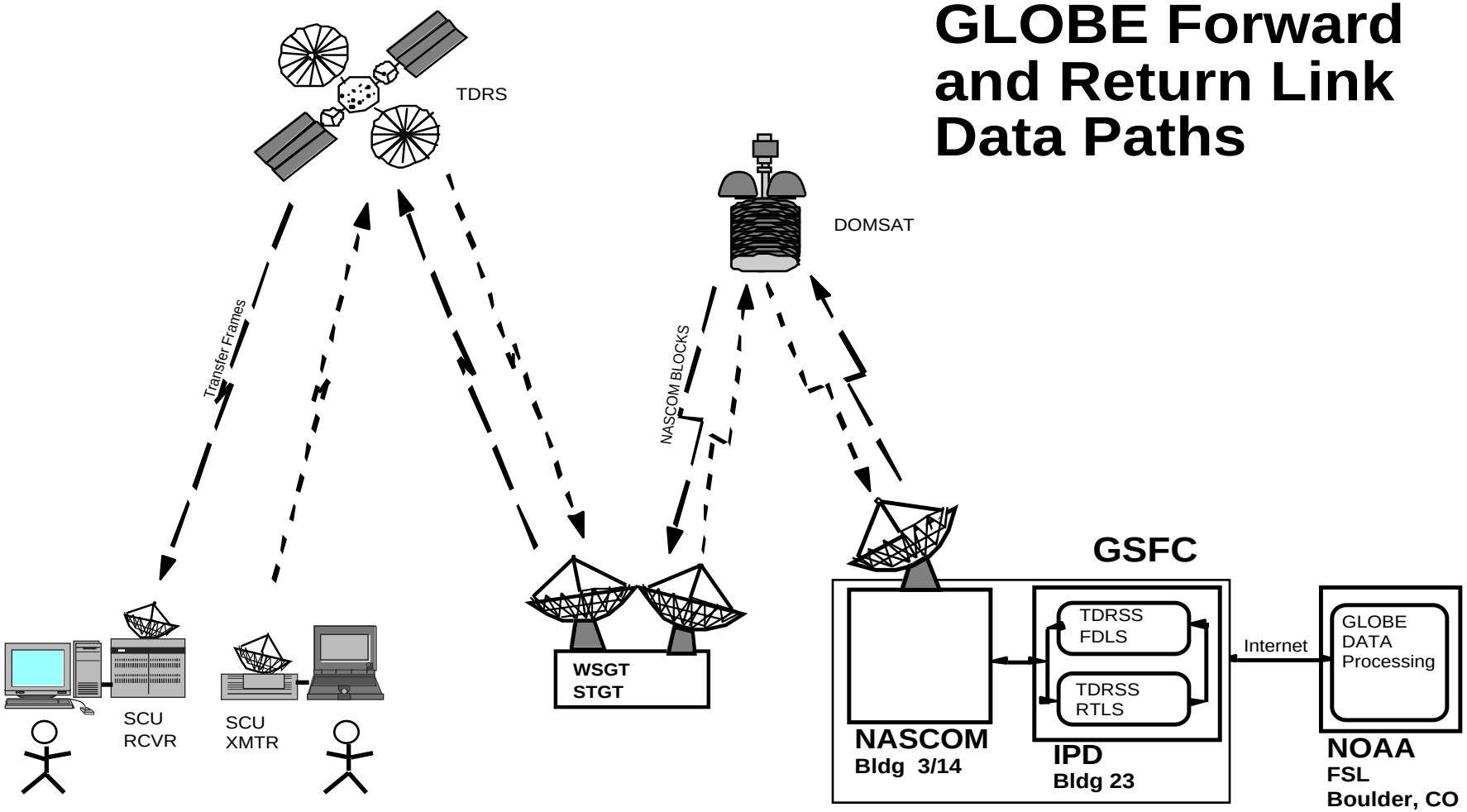
Code 514

- Overview
- Hardware
- Software
  - TDRSS Forward Link Software
  - TDRSS Return Link Software
- Current Performance Results
- NASA Head Quarters Demo
- Current User's

Overview

- **Used Commercial Off The Shelf (COTS) S-bus card to provide a telemetry interface between a SUN Workstation and NASA Communications (NASCOM)**
- **Designed, implemented, and tested software to perform both forward and return link data processing**
- **Applied telemetry processing system to GLOBE project**

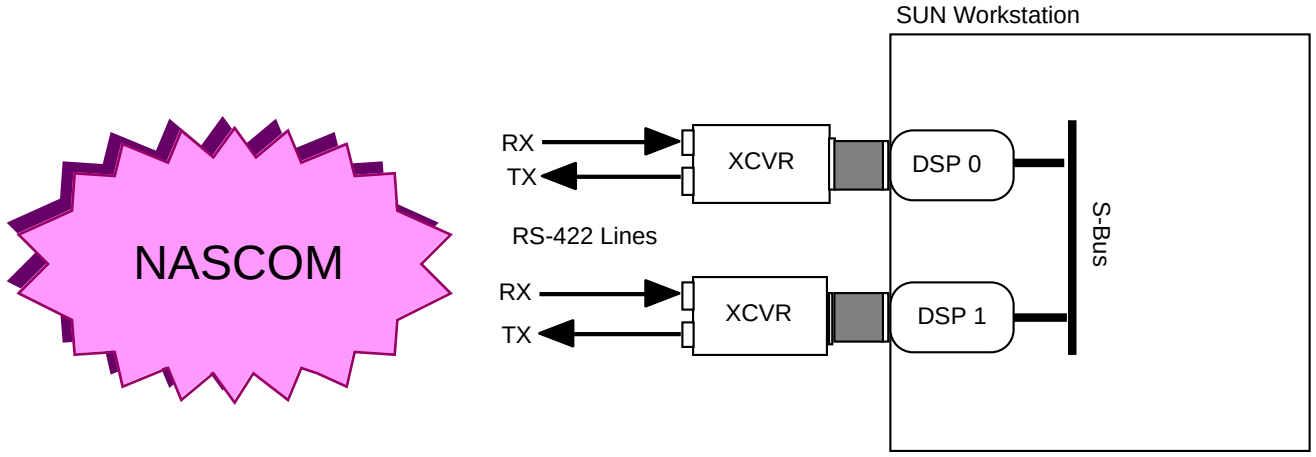
GLOBE Forward and Return Link Data Paths



SCU XMTR = Student Communications Unit Transmitter
SCU RCVR = Student Communications Unit Receiver
TDRSS FDLS = Tracking and Data Relay Satellite System Forward Link System
TDRSS RTLS = Tracking and Data Relay Satellite System Return Link System
NOAA FSL = Forecast Systems Laboratory
WSGT/STGT = White Sands Ground Terminal

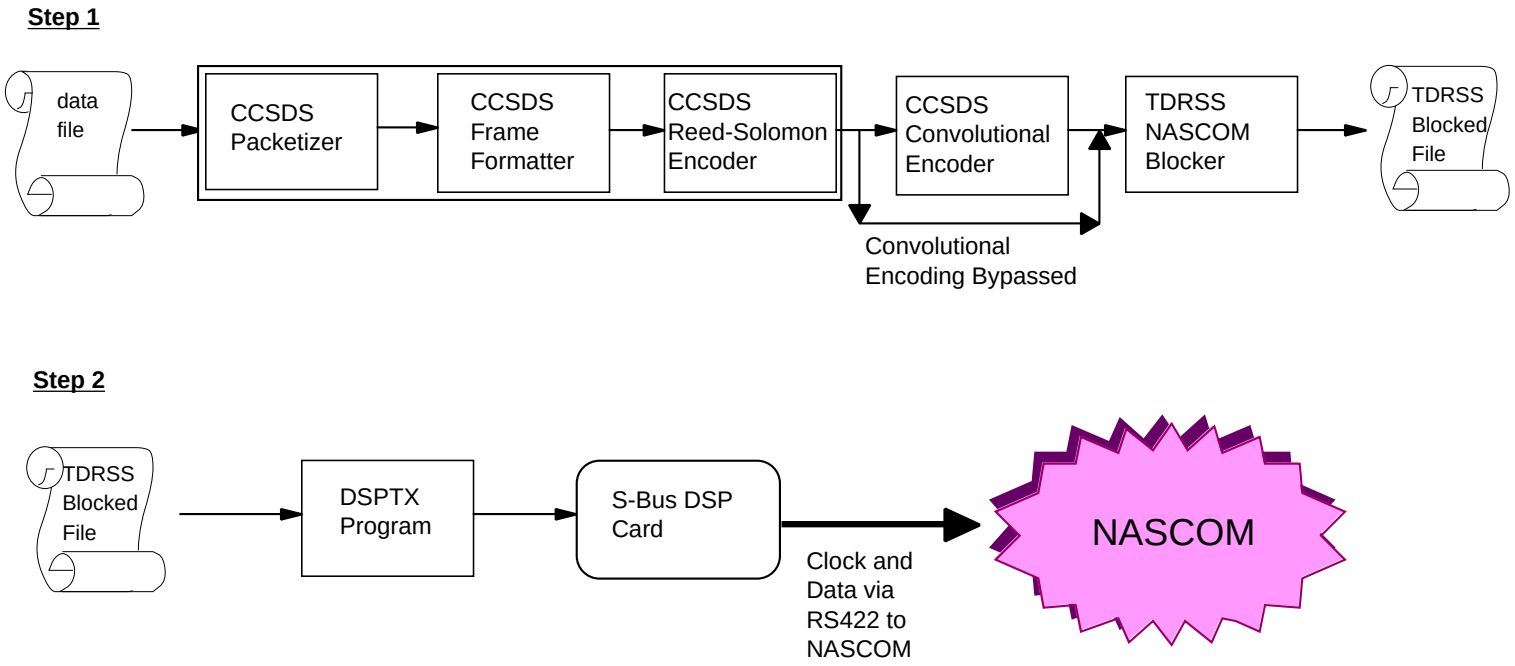
HARDWARE

- **COTS S-bus Digital Signal Processor (DSP) card with a Xilinx Field Programmable Gate Array (FPGA)**
  - **One Input or Output Channel per DSP card**
- **COTS RS-422 to TTL Transceiver**
  - **Provides RS-422 interface to S-bus DSP card**
- **COTS SUN Workstation**

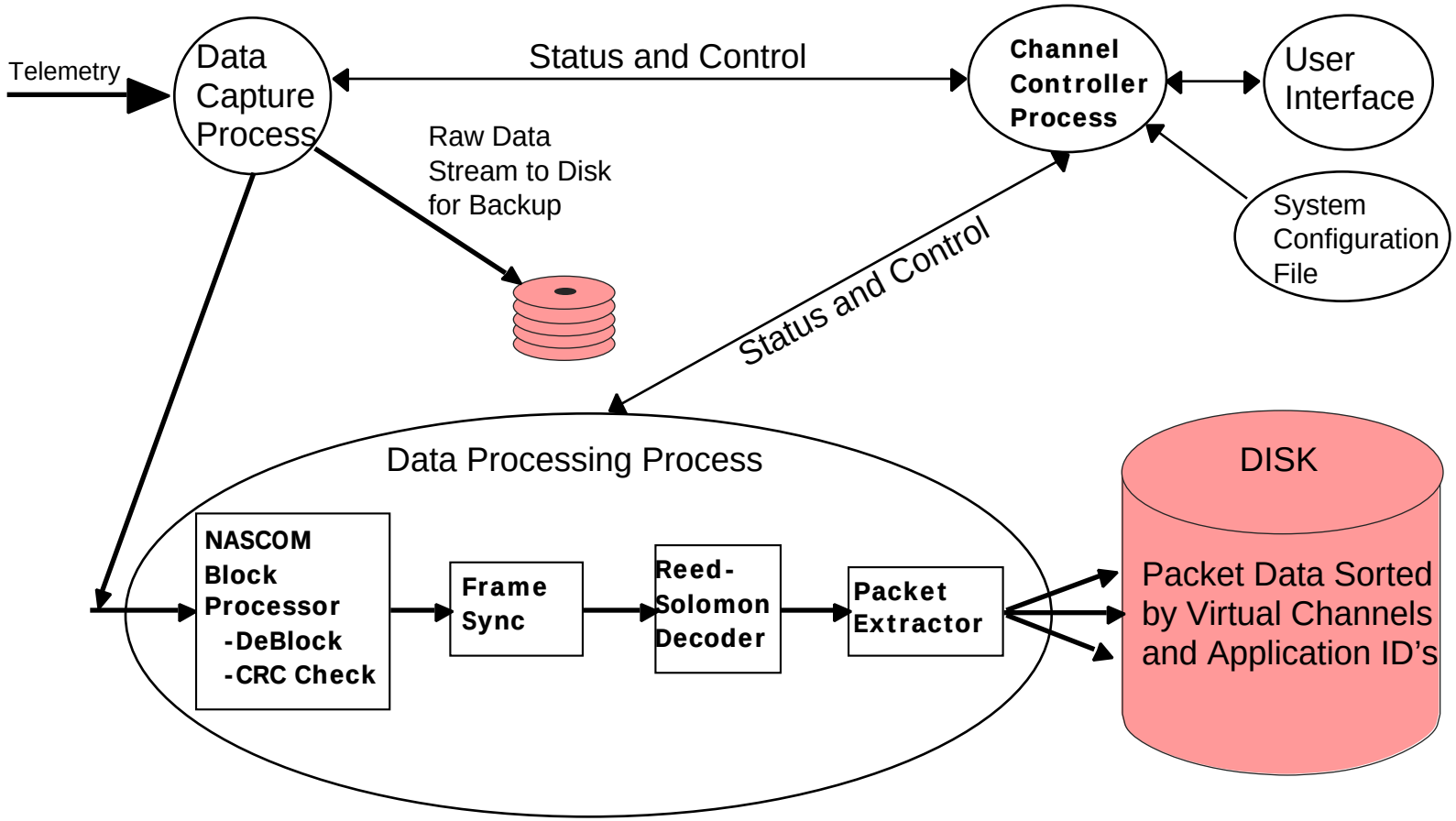


Software

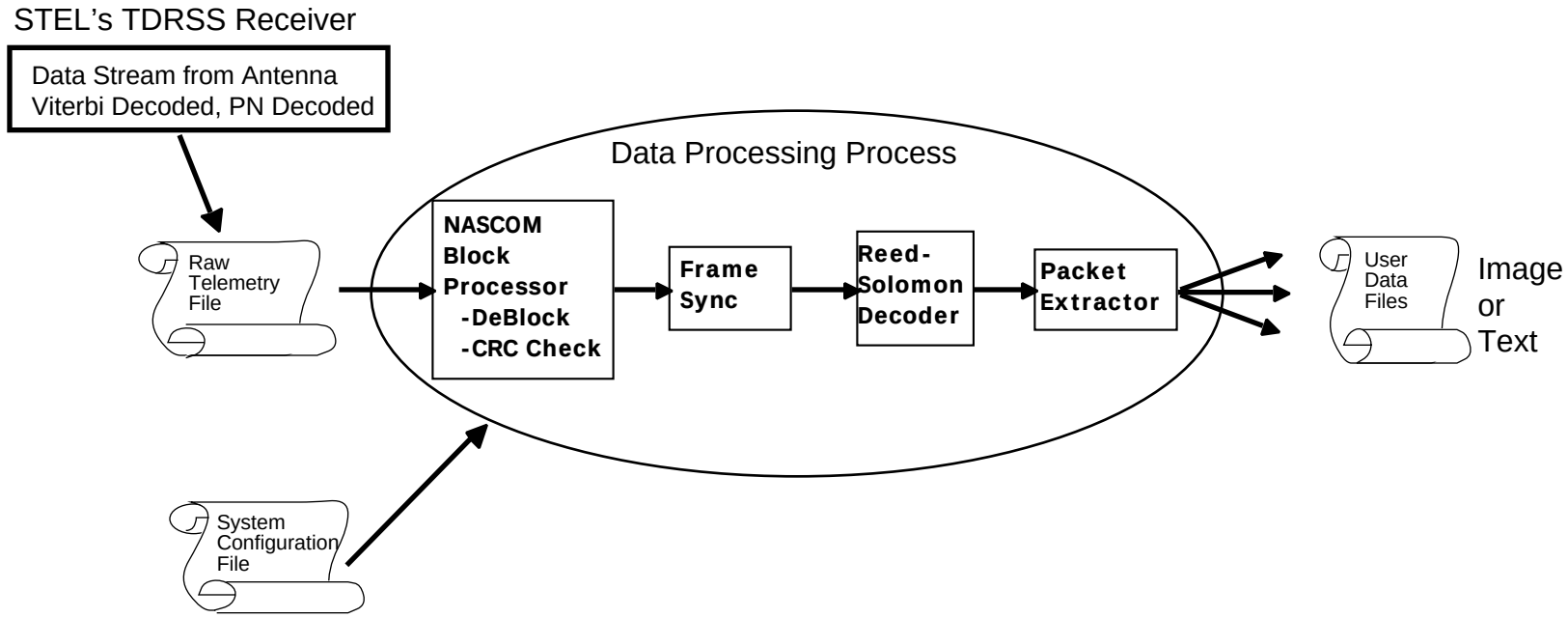
- **TDRSS Forward Link Software for GLOBE**
  - **Data Formatter**
  - **CCSDS Compliant Convolutional Encoder**
  - **NASCOM TDRSS/MDM Blocker**
  - **Software to transmit blocked files through S-bus DSP card**



TDRSS Return Link Software
Software Front End Block Diagram (Workstation Version)



Software Front End Block Diagram (PC Version for GLOBE)
Forward Link - TDRSS MA - Broadcast Files to Schools



Current Performance Results

Software Front End

- **50 MHz SPARCclassic**
  - **up to 500 kbps**
- **SPARC 5 w/ 70 MHz microSPARC Processor**
  - **up to 1 Mbps**
- **25 MHz 486SX (lap top PC)**
  - **up to 95 kbps**

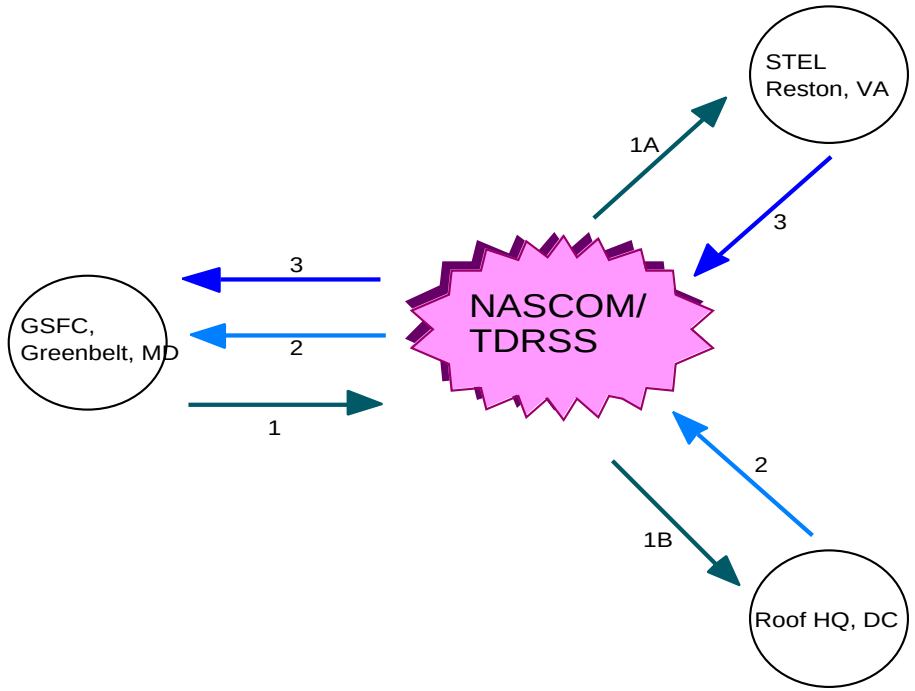
NASA HQ Demo

Code 514

1) Forward link transmission from GSFC to TDRS-E.
1A) "Broadcast" signal from TDRS-E received by STEL engineers at Reston, VA.
1B) "Broadcast" signal from TDRS-E received by STEL engineers on the roof NASA HQ, DC.

2) Return link data flow from transmitter on the roof of the NASA HQ building in DC.

3) Return link data flow from the transmitter at STEL in Reston, VA.



Current User's

- ACE (Advanced Composition Explorer) Ground System
- EUVE (Extreme Ultraviolet Explorer) Ground System
- PORTCOM (Portable Communications) (formerly GLOBE)
- Standford Telecom
- PTP (Programmable Telemetry Processor, NASA, GSFC)
- Landsat 7 Ground System
- TRW for EOS (Earth Observing System) Ground System